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(54) **EXTRUDABLE BLACK BODY DECOY FLARE COMPOSITIONS AND METHODS OF USE**

EXTRUDIERBARE FLAREMASSEN ZUM BILDEN EINES SCHWARZEN STRAHLERS UND VERWENDUNG SOLCHER MASSEN

COMPOSITIONS POUVANT ETRE EXTRUDEES POUR LEURRES THERMIQUES A BASE DE CORPS NOIR ET METHODES D'UTILISATION

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Description

FIELD OF THE INVENTION

[0001] The present invention is related to extrudable black body decoy flare compositions that dramatically improve processibility while maintaining the infrared radiation intensity of conventional decoy flare compositions. More particularly, the present invention is related to such compositions that are also capable of serving as a heat-seeking missile decoys for aircraft, tanks, and trucks.

BACKGROUND OF THE INVENTION

[0002] Aircraft-launched flares of various types have been used for many purposes. For example, it is often desirable to light a particular area at night. A flare may be used to produce light for search and rescue operations or for various military purposes. It is also well known to employ flares as a decoy tactic. That is, a flare may be used to cover the path of an aircraft through a particular area. One common situation is when the aircraft is encountering anti-aircraft fire. The use of a flare can distract the anti-aircraft fire sufficiently to allow the aircraft to proceed safely on its course.

[0003] Anti-aircraft missiles are commonly used in modern warfare. Such missiles may be launched from the ground or they may be launched from another aircraft. Many of this type of missile are designed to seek particular types of emissions characteristic of aircraft. Such emissions often take the form of heat and infrared light. Thus, "heat-seeking" missiles are often used against aircraft.

[0004] In this context, it is desirable to provide a flare that produces the type of emissions sought by the missile in order to distract the missile from the actual aircraft. Thus, flares that emit heat and infrared are well known and have been used for many years.

[0005] Conventional decoy flare materials have been a combination of magnesium and polytetrafluoroethylene (PTFE or "Teflon® "). These compositions are known widely as magnesium-Teflon® flare compositions. These formulations produce a black body emission spectrum which has been used as a decoy for jet engines.

[0006] Current methods of producing magnesium-PTFE flare compositions require the use of. solvents that are ozone-depleting or flammable. In one currently used method, the composition is produced by depositing the binder on the pyrotechnic mixture through solvent loss using, for example, acetone or methyl-ethyl ketone. The mixture is dried, after which it is consolidated through pressing or extrusion operations. In a second method, a binder such as Viton A® , which is a fluorinatèd ethylene propylene copolymer sold by DuPont, is deposited on the pyrotechnic mixture through polymer precipitation methods using hexane and acetone. The dried pyrotechnic powder is then consolidated through pressing or extrusion operations. This method requires large quantities of acetone and hexane, which are flammable, to carry the Viton A® binder. The solvents used in these methods have been the source of many fires during the processing of decoy mixes. US 5.585.594 discloses such a method.

[0007] An additional problem with conventional magnesium-PTFE compositions is that they are very sensitive. Moreover, such compositions require extensive operator exposure during mixer dumping, oven loading, and material break-up operations. Traditional methods have proven disadvantageous, as the processing and handling of conventional flare compositions is dangerous and has resulted in many injuries and even deaths. An additional problem with conventional magnesium-PTFE compositions is that such compositions typically require expensive ingredients such as specialty binders and spherical magnesium.

[0008] Accordingly, it would be a significant advancement in the art to provide compositions and methods of producing decoy flares that overcame the identified problems of producing conventional flares. In particular, it would be an advancement to provide flare compositions that eliminate the safety risks associated with handling unconsolidated pyrotechnic powder. It would also be an advancement in the art to provide flare compositions and methods of production that eliminate ozone-depleting or flammable solvent emissions that accompany production. It would be a further advancement in the art to provide such flare compositions that could be manufactured using traditional press/extrusion techniques or using a twin screw extruder.

[0009] It would also be an advancement to provide such compositions that exceed the radiometric performance of conventional magnesium-PTFE infrared decoy flare compositions. It would be a further advancement in the art to provide such compositions that cost less than conventional flare compositions to produce.

[0010] Such compositions and methods for producing decoy flares are disclosed and claimed herein.

SUMMARY AND OBJECTS OF THE INVENTION

[0011] The present invention is related to new compositions that produce black body radiation when ignited. A black body radiator is generally defined as a material that radiates over a broad spectrum, as described by the following equation:

$$M = \varepsilon\sigma T^4 \ Wcm^{-2}$$

where:

ε = emissivity
T = absolute temperature
σ = Stefan-Boltzmann constant
M = exitance

[0012] The novel extrudable black body decoy flare compositions defined herein function in a manner similar to conventional magnesium-PTFE infrared decoy flares: heat produced by the flare decoys the heat-seeking missile away from the target. The principle difference between a conventional magnesium-PTFE flare composition and this new flare composition is that the compositions of the present invention utilize polyaromatic thermoplastics rather than solvent deposition fluor-polymers (e.g., Viton A®) or poly-olefins as the binder component. The polyaromatic thermoplastic facilitates the processing of the flare material via extrusion without the use of solvents.

[0013] The primary reaction products of a conventional magnesium-PTFE flare are solid carbon and liquid magnesium fluoride. The high emissivities of these reaction products result in an efficient black body radiating plume. In contrast, the polyaromatic thermoplastic of the present invention pyrolyzes during flare combustion to produce carbon particles. This pyrolysis of the binder results in an efficient black body radiator in the exhaust plume.

[0014] The present invention relates to the use of polyaromatic thermoplastic compounds such as polystyrene and dimethyl phthalate as the binder in a black body decoy flare. The thermoplastic compounds enable a magnesium-PTFE flare composition to be extruded without the use of solvents. In addition, the aromatic rings are reduced to carbon in the fuel rich composition, producing an ideal incandescent species that augments the signature.

[0015] Pyrotechnic art teaches that the radiometric output of traditional flare formulations is directly tied to the binder content of the flare. Low binder levels (4%) produce the greatest radiometric output and high binder levels (8%) produce lower radiometric output. One traditional method for augmenting the radiometric output of a flare formulation when higher binder levels are required is to use a fluorocarbon (such as Viton A®) or high energy binder (e.g., a polyoxetane binder such as BAMO/AMMO). This increases the oxidative potential of the binder component. Therefore, it was unexpected that high polyaromatic binder (16%) content flares produced an increased output when compared to a standard magnesium-PTFE flare.

[0016] Some of the primary benefits of the present invention are enhanced processibility, increased performance, elimination of solvents, and reduction in material and labor costs. Extrusion of flares containing polyaromatic thermoplastic binders increases processibility over traditional pressed flares by eliminating oven cure time, increasing processing line speed, decreasing labor costs, and significantly reducing the risk to operators from unconsolidated pyrotechnic exposure. The radiometric output of the flare is improved over traditional pressed magnesium-PTFE flares. The use of thermoplastic binders eliminates the need to use solvents to process the flare compositions. The solvents traditionally used are ozone-depleting or flammable. Elimination of solvents increases the environmental friendliness of the process and safety to operators. Polyaromatic thermoplastics are commonly used in the manufacture of a wide variety of products ranging from coffee cups to children's toys. These materials are far less expensive than halocarbons such as Viton A® or specialty binders commonly used in the manufacture of infrared flares.

[0017] Flares manufactured using compositions of the present invention are more easily demilitarized than flares manufactured using conventional compositions. Compositions utilizing polyaromatic thermoplastic binders may be removed from the flare casing by heating. This is to be contrasted with conventional flare materials which can be demilitarized only by complex and expensive mechanical or chemical processes.

[0018] These and other objects and advantages of the invention will become apparent upon reading the following detailed description and appended claims, and upon reference to the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

[0019]

Figure 1 is a graph illustrating the radiometric data generated by burning a pressed baseline magnesium-PTFE decoy flare composition.

Figure 2 is a graph illustrating the radiometric data generated by burning a composition within the scope of the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0020] The present invention provides improved extrudable black body decoy flare compositions and methods of use. The compositions are capable of producing significant amounts of black body radiation. At the same time, the compositions avoid some of the problems encountered with conventional flare compositions, including the handling of unconsolidated pyrotechnic powder and solvent emissions. Additionally, flares produced according to the method of the present invention cost less to produce than conventional flares.

[0021] Accordingly, the compositions of the present invention comprise a metal fuel, PTFE as the main oxidizer, and a polyaromatic thermoplastic binder. Other additives, including curing agents and burn rate modifiers, are used as is known in the art to tailor other characteristics of the composition. In summary, the present invention provides new and useful extrudable black body flare compositions.

[0022] A typical flare composition according to the present invention includes the following components in the following percentages by weight:

Ingredient	Weight Percent
Magnesium	40 to 70
Teflon®	10 to 40
Polyaromatic Thermoplastic Binder	8 to 30
Plasticizer	0 to 24

[0023] Magnesium is the fuel of choice, although other metals, such as aluminum and mixtures of aluminum and magnesium, could also be used. Magnesium is easily ignited and has a strong capability to after-burn in the plume behind the flare. This after-burning is important to augment the infrared signature of the plume without increasing the combustion chamber's internal temperature. Magnesium used in the compositions of the present invention may be chipped, spherical, or a mixture of chipped and spherical. Chipped magnesium is less expensive than spherical magnesium.

[0024] It is presently preferred that the metal be in the range of from about 40% to about 70% by weight. Most formulations falling within the scope of the present invention will have metal in the range of from about 45% to about 65% by weight. Generally, good results have been obtained with formulations in which magnesium is present at from about 64% to about 66% by weight.

[0025] As in conventional magnesium-PTFE flare compositions, PTFE ("Teflon® ") is the oxidizer in compositions of the present invention. It is presently preferred that PTFE be present in the range of from about 10% to about 40% by weight. Most formulations falling within the scope of the present invention will have PTFE in the range of from about 20% to about 35% by weight. Generally, good results have been obtained with formulations in which PTFE is present at about 25% by weight.

[0026] The flare formulations also include a polyaromatic thermoplastic binder. In certain presently preferred embodiments, the polyaromatic thermoplastic binder is comprised of polystyrene, which is commercially available, for example, from Amoco. Acrylonitrile butadiene styrenes (ABS) may be substituted for polystyrene. The polystyrene or ABS may be plasticized using phthalates, including dimethyl phthalate, diethyl phthalate, dibutyl phthalate, dioctyl phthalate, poly terephthalate, and poly ethyl terephthalate. Also usable are para or ortho substituted chloropolystyrenes, nitropolystyrenes, polyacenaphthalene, polyvinylcarbozol, polyvinylfluorene, other polyvinylaromatics, α methylpolystyrenes, α chloropolystyrenes, α alkylpolystyrenes, and copolymers of polystyrene, with, for example, butadiene acrylonitrile, and acrylic acid. In certain presently preferred embodiments, the polyaromatic thermoplastic is dimethyl phthalate-plasticized polystyrene.

[0027] The amount and content of the plasticizer may be varied to adjust the melting point of a flare composition. The melting point of the composition may be chosen to increase the ease of production or to meet the requirements of a specific tactical environment (e.g., a composition may be designed for long-term storage in a warm climate). Generally, the melting point of a composition decreases as the amount of plasticizer increases. Compositions with low melting points are easier to handle than compositions with higher melting points. However, compositions with low melting points do not maintain their mechanical properties as well as higher melting point compositions during high temperature (up to about 73,88°C (165°F)) storage. It is presently preferred that the plasticizer be present at up to about 80 weight percent of the polyaromatic thermoplastic binder. More particularly, the plasticizer is present at about 50 weight percent of the binder.

[0028] It is presently preferred that the polyaromatic thermoplastic binder be present at from about 8% to about 30% by weight. More particularly, the binder is present in the range of from about 10% to about 20% by weight. Generally, good results have been obtained with formulations in which the binder is present at about 14% to about 16% by weight.

[0029] The compositions of the present invention may also include conductive carbon fibrils, which reduce the composition's susceptibility to electrostatic discharge.

EXAMPLES

[0030] The following examples are given to illustrate various embodiments which have been made or may be made in accordance with the present invention. These examples are given by way of example only, and it is to be understood that the following examples are not comprehensive or exhaustive of the many types of embodiments of the present invention which can be prepared in accordance with the present invention.

Example 1

[0031]

Ingredient	Weight Percent
Magnesium (spherical)	66.0
Teflon®	20.0
Polystyrene	7.0
Dimethyl phthalate	7.0

[0032] This composition exceeds the radiometric performance of fielded magnesium-PTFE decoy flares. Figure 1 illustrates the radiometric data generated by burning a pressed baseline magnesium-PTFE decoy flare composition that is within the scope of the prior art. Figure 2 illustrates the radiometric data generated by burning this composition. A comparison of these figures demonstrates that the radiometric output of this composition exceeds the radiometric output of the conventional composition.

Example 2

[0033]

Ingredient	Weight Percent
Magnesium (spherical or a 50-50 mixture of spherical and chipped)	64.0
Teflon®	20.0
Polystyrene	8.0
Dimethyl phthalate	8.0

[0034] This composition was extruded using a ram extruder, although this composition could also be extruded using a single or twin screw extruder.

Summary

[0035] In summary, the present invention provides new and useful black body decoy compositions and methods of use. These compositions may be extruded without the use of solvents. Such compositions overcome some of the major drawbacks of decoy flare compositions. Thus, the flare compositions of the present invention represent a significant advancement in the art.

[0036] The present invention may be embodied in other specific forms without departing from its characteristics. The described embodiments are to be considered in all respects only as illustrative and not restrictive. The scope of the invention is, therefore, indicated by the appended claims rather than by the foregoing description.

Claims

1. A method of producing a black body decoy flare, the method comprising the steps of:

    a. preparing a mixture comprising magnesium, polytetrafluoroethylene, and a polyaromatic thermoplastic bind-

er; and
b. extruding the mixture into a flare grain form.

2. A method of producing a black body decoy flare as defined in claim 1, wherein the polyaromatic thermoplastic binder comprises a styrene, said styrene being polystyrene or acrylonitrile butadiene styrene, and a plasticizer selected from the group consisting of dimethyl phthalate, diethyl phthalate, dibutyl phthalate, dioctyl phthalate, poly terephthalate, poly ethyl terephthalate, para or ortho substituted chloropolystyrenes, nitropolystyrenes, polyacenaphthalene, polyvinylcarbozol, polyvinylfluorene, α methylpolystyrenes, α chloropolystyrenes, α alkylpolystyrenes, copolymers of polystyrene, and mixture thereof.

3. A method of producing a black body decoy flare as defined in claim 1, wherein the polyaromatic thermoplastic binder comprises polystyrene and dimethyl phthalate.

4. A method of producing a black body decoy flare as defined in claim 1, wherein the preparation of the mixture is substantially free of solvents.

5. A method of producing a black body decoy flare as defined in claim 1, wherein the magnesium is present from about 40% to about 70% by weight.

6. A method of producing a black body decoy flare as defined in claim 1, wherein the polytetrafluoroethylene is present from about 10% to about 40% by weight.

7. A method of producing a black body decoy flare as defined in claim 1, wherein the polyaromatic thermoplastic is present from about 8% to about 30% by weight.

8. A method of producing a black body decoy flare as defined in claim 1, wherein a plasticizer is present at up to 80 weight percent of the polyaromatic thermoplastic binder.

9. A method of producing a black body decoy flare as defined in claim 1, the method comprising the steps of:

a. preparing a mixture comprising magnesium present from about 40% to about 70% by weight, polytetrafluoroethylene present from about 10% to about 40% by weight, and a polyaromatic thermoplastic binder present from about 8% to about 30% by weight; and
b. extruding the mixture into a flare grain.

10. A method of producing a black body decoy flare as defined in claim 9, wherein the polyaromatic thermoplastic binder is selected from the group consisting of polystyrene, dimethyl phthalate, or mixtures thereof.

11. A method of producing a black body decoy flare as defined in claim 9, wherein the mixture is substantially free of solvents.

12. A method of producing a black body decoy flare as defined in claim 9, wherein dimethyl phthalate is present at up to 80 weight per cent of the polyaromatic thermoplastic binder.

13. An extrudable black body decoy flare composition comprising:

from about 40% to about 70% by weight magnesium;
from about 10% to about 40% by weight polytetrafluoroethylene; and
from about 8% to about 30% by weight polyaromatic thermoplastic binder.

14. An extrudable black body decoy flare composition as defined in claim 13, wherein the polyaromatic thermoplastic binder comprises:

a styrene present from about 20 to about 100 weight percent of the binder, said styrene being polystyrene or acrylonitrile butadiene styrene; and
a plasticizer present at up to about 80 weight percent of the binder, said plasticizer being selected from the group consisting of dimethyl phthalate, diethyl phthalate, dibutyl phthalate, dioctyl phthalate, poly terephthalate, poly ethyl terephthalate, para or ortho substituted chloropolystyrenes, nitropolystyrenes, polyacenaph-

thalene, polyvinylcarbozol, polyvinylfluorene α methylpolystyrenes, α chloropolystyrenes, α alkylpolystyrenes, copolymers of polystyrene, and mixtures thereof.

15. An extrudable black body decoy flare composition as defined in claim 13, wherein the composition is substantially free of fluorinated ethylene propylene copolymers.

16. An extrudable black body decoy flare composition as defined in claim 13, wherein the composition is substantially free of polyolefins.

17. A black body decoy flare composition as defined in claim 13,
wherein the binder comprises polystyrene present from about 20 to about 100 weight percent of the binder and dimethyl phthalate present at up to 80 weight percent of the binder.

18. An extrudable black body decoy flare composition as defined in claim 17, wherein the composition is substantially free of fluorinated ethylene propylene copolymers.

19. An extrudable black body decoy flare composition as defined in claim 17, wherein the composition is substantially free of polyolefins.

Patentansprüche

1. Verfahren zur Herstellung einer Flaremasse zum Bilden eines schwarzen Strahlers, wobei das Verfahren folgende Schritte umfasst:

   a. Erstellen einer Mischung, die Magnesium, Polytetrafluorethylen und ein polyaromatisches thermoplastisches Bindemittel umfasst; und

   b. Extrudieren der Mischung in eine Flare-Kornform.

2. Verfahren zur Herstellung einer Flaremasse zum Bilden eines schwarzen Strahlers nach Anspruch 1, wobei das polyaromatische thermoplastische Bindemittel ein Styrol, wobei dieses Styrol Polystyrol oder Acrylnitrilbutadienstyrol ist, und einen Weichmacher umfasst, der ausgewählt wird aus der Gruppe, die aus Dimethylphthalat, Diethylphthalat, Dibutylphthalat, Dioctylphthalat, Polyterephthalat, Polyethylterephthalat, para- oder ortho-ersetzten Chlorpolystyrolen, Nitropolystyrolen, Polyacenaphthalen, Polyvinylcarbozol, Polyvinylfluoren, α Methylpolystyrolen, α Chlorpolystyrolen, α Alkylpolystyrolen, Copolymeren von Polystyrol und Mischungen davon besteht.

3. Verfahren zur Herstellung einer Flaremasse zum Bilden eines schwarzen Strahlers nach Anspruch 1, wobei das polyaromatische thermoplastische Bindemittel Polystyrol und Dimethylphthalat umfasst.

4. Verfahren zur Herstellung einer Flaremasse zum Bilden eines schwarzen Strahlers nach Anspruch 1, wobei die Erstellung der Mischung im Wesentlichen frei von Lösemitteln ist.

5. Verfahren zur Herstellung einer Flaremasse zum Bilden eines schwarzen Strahlers nach Anspruch 1, wobei das Magnesium von ungefähr 40 Gew% bis ungefähr 70 Gew% vorhanden ist.

6. Verfahren zur Herstellung einer Flaremasse zum Bilden eines schwarzen Strahlers nach Anspruch 1, wobei das Polytetrafluorethylen von ungefähr 10 Gew% bis ungefähr 40 Gew% vorhanden ist.

7. Verfahren zur Herstellung einer Flaremasse zum Bilden eines schwarzen Strahlers nach Anspruch 1, wobei der polyaromatische thermoplastische Kunststoff von ungefähr 8 Gew% bis ungefähr 30 Gew% vorhanden ist.

8. Verfahren zur Herstellung einer Flaremasse zum Bilden eines schwarzen Strahlers nach Anspruch 1, wobei ein Weichmacher mit bis zu 80 Gew% des polyaromatischen thermoplastischen Bindemittels vorhanden ist.

9. Verfahren zur Herstellung einer Flaremasse zum Bilden eines schwarzen Strahlers nach Anspruch 1, wobei das Verfahren folgende Schritte umfasst:

a. Erstellen einer Mischung, die Magnesium von ungefähr 40 Gew% bis ungefähr 70 Gew%, Polytetrafluorethylen von ungefähr 10 Gew% bis ungefähr 40 Gew% und ein polyaromatisches thermoplastisches Bindemittel von ungefähr 8 Gew% bis ungefähr 30 Gew% umfasst; und

b. Extrudieren der Mischung in eine Flare-Kornform.

10. Verfahren zur Herstellung einer Flaremasse zum Bilden eines schwarzen Strahlers nach Anspruch 9, wobei das polyaromatische thermoplastische Bindemittel aus der Gruppe ausgewählt wird, die aus Polystyrol, Dimethylphthalat oder Mischungen davon besteht.

11. Verfahren zur Herstellung einer Flaremasse zum Bilden eines schwarzen Strahlers nach Anspruch 9, wobei die Mischung im Wesentlichen frei von Lösemitteln ist.

12. Verfahren zur Herstellung einer Flaremasse zum Bilden eines schwarzen Strahlers nach Anspruch 9, wobei Dimethylphthalat mit bis zu 80 Gew% des polyaromatischen thermoplastischen Bindemittels vorhanden ist.

13. Extrudierbare Flaremasse zum Bilden eines schwarzen Strahlers, die folgendes umfasst:

ungefähr 40 Gew% bis ungefähr 70 Gew% Magnesium

ungefähr 10 Gew% bis ungefähr 40 Gew% Polytetrafluorethylen; und

ungefähr 8 Gew% bis ungefähr 30 Gew% polyaromatisches thermoplastisches Bindemittel.

14. Extrudierbare Flaremasse zum Bilden eines schwarzen Strahlers nach Anspruch 13, wobei das polyaromatische thermoplastische Bindemittel folgendes umfasst:

ein Styrol, das von ungefähr 20 Gew% bis ungefähr 100 Gew% des Bindemittels vorhanden ist, wobei das Styrol Polystyrol oder Acrylnitrilbutadienstyrol ist; und

einen Weichmacher, der mit bis ungefähr 80 Gew% des Bindemittels vorhanden ist, wobei der Weichmacher aus der Gruppe ausgewählt wird, die aus Dimethylphthalat, Diethylphthalat, Dibutylphthalat, Dioctylphthalat, Polyterephthalat, Polyethylterephthalat, para- oder ortho-ersetzten Chlorpolystyrolen, Nitropolystyrolen, Polyacenaphthalen, Polyvinylcarbozol, Polyvinylfluoren, α Methylpolystyrolen, α Chlorpolystyrolen, α Alkylpolystyrolen, Copolymeren von Polystyrol und Mischungen davon besteht.

15. Extrudierbare Flaremasse zum Bilden eines schwarzen Strahlers nach Anspruch 13, wobei die Masse im Wesentlichen frei von fluorierten Ethylen-Propylen-Copolymeren ist.

16. Extrudierbare Flaremasse zum Bilden eines schwarzen Strahlers nach Anspruch 13, wobei die Masse im Wesentlichen frei von Polyolefinen ist.

17. Extrudierbare Flaremasse zum Bilden eines schwarzen Strahlers nach Anspruch 13, wobei das Bindemittel Polystyrol, das mit ungefähr 20 Gew% bis ungefähr 100 Gew% des Bindemittels vorhanden ist, und Dimethylphthalat umfasst, das mit bis zu 80 Gew% des Bindemittels vorhanden ist.

18. Extrudierbare Flaremasse zum Bilden eines schwarzen Strahlers nach Anspruch 17, wobei die Masse im Wesentlichen frei von fluorierten Ethylen-Propylen-Copolymeren ist.

19. Extrudierbare Flaremasse zum Bilden eines schwarzen Strahlers nach Anspruch 17, wobei die Masse im Wesentlichen frei von Polyolefinen ist.

Revendications

1. Procédé pour obtenir un leurre thermique à corps noir, le procédé comprenant les étapes suivantes :

A. préparer un mélange comprenant du magnésium, du polytétrafluoréthylène, et un liant thermoplastique

polyaromatique, et
B. extruder le mélange dans un moule à torchère.

2. Procédé pour obtenir un leurre thermique à corps noir selon la revendication 1, dans lequel le liant thermoplastique polyaromatique comprend un styrène, ledit styrène étant du polystyrène ou un styrène butadiène d'acrylonitrile, et un plastifiant choisi dans le groupe composé de phtalate de diméthyle, de phtalate de diéthyle, de phtalate de dibutyle, de phtalate de dioctyle, de polytéréphtalate, de polyéthyltéréphtalate, de para ou ortho chloropolystyrènes substitués, de nitropolystyrènes, de polyacénaphtalène, de polyvinylcarbozol, de polyvinylfluorène, d'α-méthylpolystyrènes, d'α-chloropolystyrènes, d'α-alkylpolystyrènes, de copolymères de polystyrène et d'un mélange de ceux-ci.

3. Procédé pour obtenir un leurre thermique à corps noir selon la revendication 1, dans lequel le liant thermoplastique polyaromatique comprend du polystyrène et du phtalate de diméthyle.

4. Procédé pour obtenir un leurre thermique à corps noir selon la revendication 1, dans lequel la préparation du mélange est sensiblement dénuée de solvants.

5. Procédé pour obtenir un leurre thermique à corps noir selon la revendication 1, dans laquelle le magnésium est présent d'environ 40% à environ 70% en poids.

6. Procédé pour obtenir un leurre thermique à corps noir selon la revendication 1, dans lequel le polytétrafluoréthylène est présent d'environ 10% à environ 40% en poids.

7. Procédé pour obtenir- un leurre thermique à corps noir selon la revendication 1, dans lequel le liant thermoplastique polyaromatique est présent d'environ 8% à environ 30% en poids.

8. Procédé pour obtenir un leurre thermique à corps noir selon la revendication 1, dans lequel un plastifiant est présent jusqu'à 80 pour cent en poids du liant thermoplastique polyaromatique.

9. Procédé pour obtenir un leurre thermique à corps noir selon la revendication 1, ledit procédé comprenant les étapes consistant à :

a. préparer un mélange comprenant du magnésium présent d'environ 40% à environ 70% en poids, du polytétrafluoréthylène présent d'environ 10% à environ 40% en poids, et un liant thermoplastique polyaromatique présent d'environ 8% à environ 30% en poids ; et
b. extruder le mélange dans un moule à torchère.

10. Procédé pour obtenir un leurre thermique à corps noir selon la revendication 9, dans lequel le liant thermoplastique polyaromatique est choisi dans le groupe composé de polystyrène, de phtalate de diméthyle, ou de mélanges de ceux-ci.

11. Procédé pour obtenir un leurre thermique à corps noir selon la revendication 9, dans lequel le mélange est sensiblement dénué de solvants.

12. Procédé pour obtenir un leurre thermique à corps noir selon la revendication 9, dans lequel le phtalate de diméthyle est présent jusqu'à 80% en poids du liant thermoplastique polyaromatique.

13. Composition d'un leurre thermique extrudable à corps noir comprenant :

d'environ 40% à environ 70% en poids de magnésium
d'environ 10% à environ 40% en poids de polytétrafluoréthylène, et
d'environ 8% à environ 30% en poids de liant thermoplastique polyaromatique.

14. Composition d'un leurre thermique extrudable à corps noir selon la revendication 12, dans laquelle le liant thermoplastique polyaromatique comprend :

un styrène présent d'environ 20 à environ 100 pour cent en poids du liant, ledit styrène étant du polystyrène ou un styrène butadiène d'acrylonitrile, et

un plastifiant présent jusqu'à environ 80 pour cent en poids du liant, ledit plastifiant étant choisi dans le groupe composé de phtalate de diméthyle, de phtalate de diéthyle, de phtalate de dibutyle, de phtalate de dioctyle, de polytéréphtalate, de poly-éthyl-téréphtalate, de para ou ortho chloropolystyrènes substitués, de nitropolystyrènes, de polyacénaphtalène, de polyvinylcarbozol, de polyvinylfluorène, d'α-méthylpolystyrènes, d'α-chloropolystyrènes, d'α-alkylpolystyrènes, de copolymères de polystyrène et de mélanges de ceux-ci.

15. Composition d'un leurre thermique extrudable à corps noir selon la revendication 13, dans laquelle la composition est sensiblement dénuée de copolymères de propylène d'éthylène fluoré.

16. Composition d'un leurre thermique extrudable à corps noir selon la revendication 13, dans laquelle la composition est sensiblement dénuée de polyoléfines.

17. Composition d'un leurre thermique à corps noir selon la revendication 13, dans laquelle le liant comprend du polystyrène présent d'environ 20 à environ 100 pour cent en poids et du phtalate de diméthyle présent jusqu'à 80 pour cent en poids du liant.

18. Composition d'un leurre thermique extrudable à corps noir selon la revendication 17, dans laquelle la composition est sensiblement dénuée de copolymères de propylène éthylène fluoré.

19. Composition d'un leurre thermique extrudable à corps noir selon la revendication 17, dans laquelle la composition est sensiblement dénuée de polyoléfines.

Fig. 1

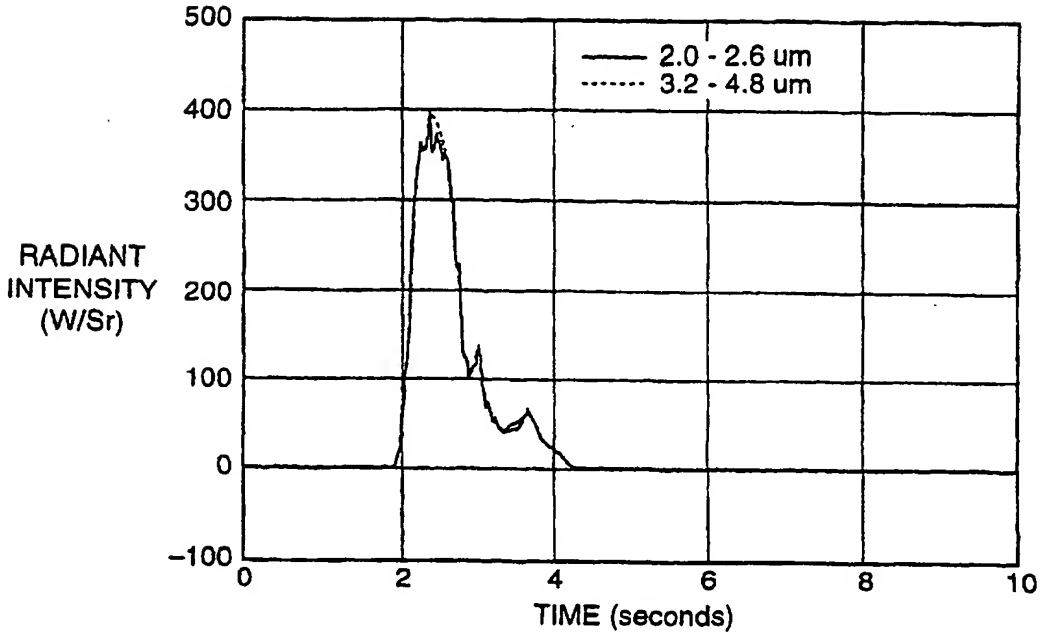
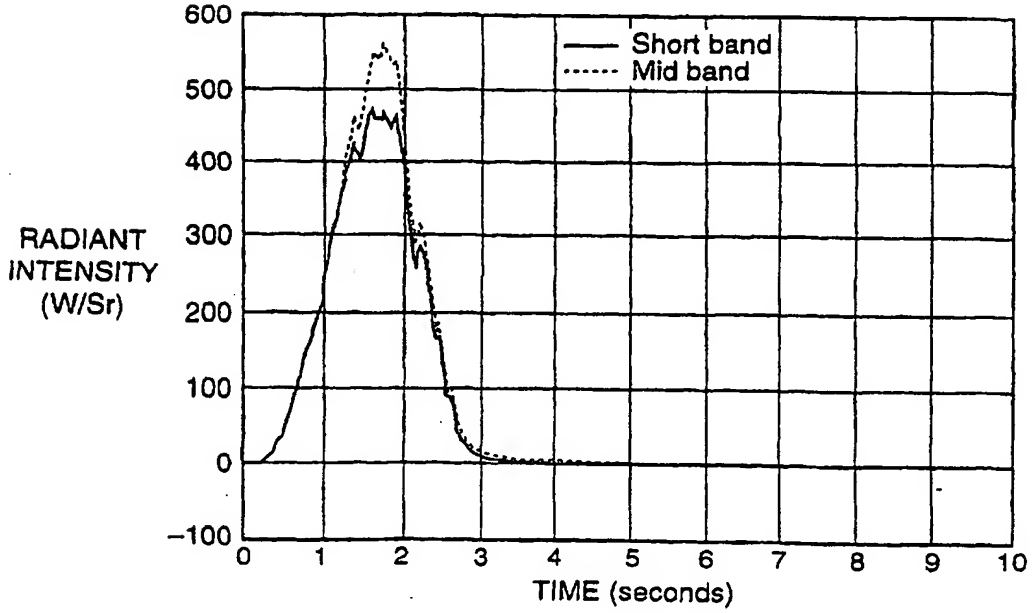

500
400
300
200
100
0
−100
RADIANT INTENSITY (W/Sr)
2.0 - 2.6 um
3.2 - 4.8 um
0
2
4
6
8
10
TIME (seconds)

Fig. 2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500
400
300
200
100
0
−100
RADIANT INTENSITY (W/Sr)
Short band
Mid band
0
1
2
3
4
5
6
7
8
9
10
TIME (seconds)